STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DIVISION OF UNDERGROUND STORAGE TANKS

TECHNICAL GUIDANCE DOCUMENT - 007

EFFECTIVE DATE - JANUARY 1, 1994
REVISED DATE - AUGUST 1, 1996

RE: MONITORING AT UST SITES

The purpose of this Technical Guidance Document (TGD) is to assist the regulated community in determining the requirements for periodic monitoring and reporting at UST sites.

All work associated with this TGD shall be performed in accordance with the applicable sections of the Environmental Assessment Guidelines.

I. Monitoring Program Components

A. Comprehensive

Comprehensive Monitoring shall consist of the following activities in sequence:

1. Water Monitoring

   a. Obtaining water and free product level measurements from all monitoring wells;

   b. Obtaining free product level measurements from any release detection wells, if applicable;

   c. Sampling all monitoring wells and recovery wells; and,

   d. Sampling all springs and water supplies approved by the Division.

2. Vapor Monitoring

   Vapor monitoring of all subsurface structures (i.e. basements, utility vaults, sewers, etc.) within 300 feet of known contamination. Known contamination shall be defined as all sampling locations where analytical results document contamination above the applicable cleanup levels or where free product has been observed. All structures which have been previously impacted by petroleum vapors shall also be monitored.

B. Site Status

Site Status Monitoring shall consist of the following activities:

1. Water Monitoring

   a. Obtaining water and free product level measurements from all monitoring wells;

   b. Obtaining free product level measurements from any release detection wells, if applicable;

   c. Sampling all monitoring wells approved by the Division;

   d. Sampling all springs and water supplies approved by the Division; and,

   e. Sampling the influent and effluent of the ground water treatment system, if applicable.

2. Vapor Monitoring

   Vapor Monitoring of all subsurface structures (i.e. basements, utility vaults, sewers, etc.) within 300 feet of known contamination. Known contamination shall be defined as all sampling locations where analytical results document contamination above the applicable cleanup levels or where free product has been observed. All structures which have been previously impacted by petroleum vapors shall also be monitored.

3. Emissions Monitoring

   Emissions monitoring from the soil vapor extraction system, if applicable. At a minimum, measurements of the total volatiles as measured by an organic vapor detector shall be taken.

C. Soil

Soil Monitoring shall consist of the installation of one boring in the location where the highest level of soil contamination was known to exist through previous site assessment activities.

II. Monitoring Programs

A. Corrective Action

Corrective Action Monitoring shall be performed upon approval of the Corrective Action Plan by the Division, and consist of the following:

1. Comprehensive Monitoring shall be performed within seventy-two hours prior to the start-up of the ground water corrective action system.

2. Site Status Monitoring shall be performed every six months thereafter until the ground water contaminant concentrations are below the applicable cleanup levels. Closure Monitoring shall commence 20 to 30 days after the Division approves the termination of the ground water corrective action system in accordance with Item C. below.

3. Soil Monitoring shall be conducted two years after the soil corrective action system becomes operational. It shall continue every two years thereafter until the soil contaminant concentrations decrease below the applicable cleanup levels.

B. Monitoring Only

A monitoring only program shall be implemented upon the Division's approval and consist of the following:

1. Comprehensive Monitoring shall be performed 20 to 30 days after the Division approves a monitoring only request.

2. Site Status Monitoring shall be conducted every six months thereafter until:

   a. Contaminant concentrations are below the applicable cleanup levels; or,

   b. The Division requires additional activities.

   If the analytical results indicate contaminant concentrations are below the applicable cleanup levels, Closure Monitoring shall commence the next quarter in accordance with Item C. below and upon approval of the Division.

3. Soil Monitoring shall be performed every two years, until the soil contaminant concentrations are below the applicable cleanup levels or the Division requires additional activities.

C. Closure

Closure Monitoring shall be performed to determine that the ground water contaminant concentrations remain below the applicable cleanup levels for one year and shall consist of four (4) consecutive quarters of sampling using the following procedures:

1. Comprehensive Monitoring shall be conducted 20 to 30 days after the Division approves the start of a Closure Monitoring Program.

2. Site Status Monitoring shall be performed the second and third quarters.

3. Comprehensive Monitoring shall be conducted the fourth quarter.

If contaminant concentrations are detected above the applicable cleanup levels during closure monitoring, additional activities associated with corrective action may be required.

Refer to the UST Monitoring Summary at the end of this Guidance Document to determine when to perform each type of monitoring.

III. Report Preparation

Within thirty (30) days after sample collection, a report shall be prepared and submitted containing the following information:

A. Progress

For sites in corrective action, supply an "as built" equipment diagram. This diagram shall be submitted only in the first monitoring report after the system(s) has been installed or in any subsequent reports after a major modification as been made to the corrective action system(s).

If any corrective action has taken place since the last report, briefly describe the progress of the corrective action system(s) to date.

1. Based upon the readings taken during routine operation and maintenance (O & M) visits to the site, provide the average flow rate and the estimated total gallons of water treated for the reporting period. (Report this amount in Table 1)

2. Provide the gallons of free product removed during the reporting period and the total gallons removed to date. (Report this amount in Table 1) Describe the method for management and disposal of the free product.

3. Provide in Table 1 all monthly costs incurred at the site and the total costs incurred to date associated with monitoring and O and M. Costs shall include but not be limited to the following: all personnel time on and off site, report preparation, analytical costs, equipment rental, supplies, capital equipment, repairs, utilities, fees, per diem and mileage.

4. If modifications are made to a corrective action system, briefly explain the modifications and why they were necessary.

5. For each site visit, briefly describe the purpose of the visit including the length of time on the site and the names of the personnel and position/title on the site.

B. Problems

Briefly describe any problem(s) which have been encountered since the previous report and the actions taken to resolve the problem(s). If applicable, report in Table 1, the percent of time the treatment system was out of operation during the reporting period.

C. Water Monitoring

1. Potentiometric Data

a. Provide a table, prepared in accordance with Section D.1.c. of the Initial Site Characterization Report Guidelines (ISCRG), from the data collected from all events.

b. Provide two potentiometric maps, prepared in accordance with Section D.1.d of the ISCRG, from the data collected during the last two monitoring periods.

2. Analytical Data

a. Provide a table, prepared in accordance with Section D.5 of the ISCRG, using analytical results from all events.

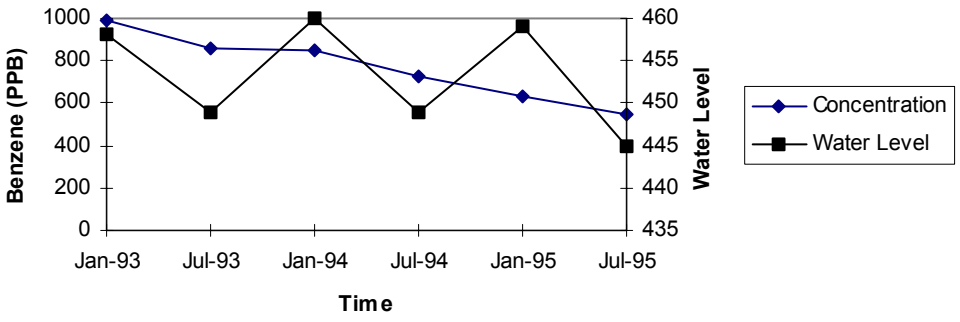
Provide all laboratory analysis sheets for this monitoring period in an appendix. Include the TN UST Facility ID Number on all laboratory analysis sheets. A copy of the chain of custody sheets shall be in the appendix.

Photostatic copies of the laboratory analysis sheets are not acceptable.

b. Provide a graph for each monitoring well sampled showing the ground water contaminant concentrations for benzene and TPH and ground water levels versus time.

Provide a graph for each monitoring event showing the influent and effluent contaminant concentrations for benzene and TPH for sites in ground water corrective action.

Use all ground water data and indicate the point in time in which the system became operational. Use the example below as a guide.



c. If Comprehensive Monitoring was conducted during the current monitoring period, provide a plume map(s) prepared in accordance with Section D.7. of the ISCRG.

D. Vapor Monitoring Results

Describe the results of the vapor monitoring. Provide a map showing the locations of the monitoring points and a table indicating the results of the monitoring.

E. Emissions Monitoring Results

Describe the results obtained from the monitoring of any soil vapor extraction systems and provide a table with the results of all sampling events.

F. Soil Monitoring Results

Describe the results of any soil sampling conducted during the reporting period. Provide a table with all soil analytical results obtained in accordance with this TGD.

If a soil vapor extraction system is being used, provide a zone of influence map showing the extent of vapor drawdown to a minimum 1 (one) inch of water.

G. Additional Information

Provide any additional information which was included in the approved CAP or required by the Division. If applicable, provide this additional information in tables or maps.

H. Signature Page

A signature page, as shown below shall be attached to the monitoring report. The page shall be signed by the owner/operator (or authorized representative within the organization) and a registered professional geologist under the Tennessee Geologist Act (*T.C.A. §62-36-101 et seq*.), or a registered professional engineer under the Tennessee Architects, Engineers, Landscape Architects, and Interior Designers Law and Rules (*T.C.A. §62-2-101 et seq*.).

We, the undersigned, certify under penalty of law, including but not limited to penalties for perjury, that the information contained in this report form and on any attachments, is true, accurate and complete to the best of our knowledge, information, and belief. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for intentional violations.

_____	_____	_____
Owner/Operator (Print name)	Signature	Date
	_____	
	Title (Print)	
_____	_____	_____
P.E. or P.G. (Print name)	Signature	Date
	_____	
	Tennessee Registration #	

Note: Each of the above signatures shall be notarized separately with the following statement.

STATE OF _____ COUNTY OF _____

Sworn to and subscribed before me by _____on this date

_____. My commission expires _____.

_____	_____	_____
Notary Public (Print name)	Signature	Date

Stamp/Seal

MONITORING REPORT
Table 1

TN UST FACILITY ID NUMBER:_____

Reporting Period	From: To:	From: To:	From: To:	From: To:
Avg. Flow Rate (GPM)				
Total Gallons Pumped Per Period				
Cumulative Total- Gallons Pumped				
% Time System Was Down				
Gallons of Free Product Removed				
Cumulative Gallons of Free Product Removed				

The Reporting Period described above shall be a six month interval.

Month						
# of Site Visits per Month						
Electrical Cost per Month						
Cumulative Electrical Costs To Date						
All Costs per Month						
Cumulative Costs To Date (Monitoring and O & M)						

The Reporting Period for O & M costs is monthly.

UST Monitoring Program Summary

Monitoring Program Components	When to Perform	Description
Comprehensive (Water and Vapor)	1. Before CA system startup (Baseline). 2. Upon system shutdown(1st qtr. of Closure Monitoring). 3. The 4th quarter of Closure Monitoring. 4. Before beginning a Monitoring Only Program.	Sample all monitoring wells and recovery wells. Also all springs and water supplies proposed by the CAC and approved by the Division. Monitor for vapors in all subsurface structures (i.e. basement, sewers, utilities) within 300 feet of known contamination. Also any structure previously impacted by petroleum vapors.
Site Status (Water, Vapor, and Emissions)	1. Every six months during the operation of the corrective action system. 2. Every six months during Monitoring Only. 3. During the 2nd and 3rd quarter of Closure Monitoring.	Sample all monitoring wells proposed by the CAC and approved by the Division. The influent and effluent of the treatment system. Monitor for vapors in all subsurface structures (i.e. basement, sewers, utilities) 300 feet of known contamination. Also any structure previously impacted by petroleum vapor. Monitoring of the system's air effluent.
Soil	Every two years until achieving soil cleanup goals.	One boring in the area of highest soil contamination to monitor contaminant reduction.